Appendix D

For the Potential Addition
of
Hijack Mode Operations

DRAFT
Version 0.b

(Revised to specify the replacement of Section §3.1.2 for "Inadvertent Turn Off" as requested by Eurocae WG-49 to harmonize with ED-73C)

FORWARD

This Appendix is being presented in order to assist the implementor who may be interested in providing the capabilities that were originally outlined in Change 1 to RTCA/DO-181C for the addition of Hijack Mode Operations to a Mode S transponder.

The actual content of Change 1 to RTCA/DO-181C is being provided here with all references updated to reflect the possibility of using this Appendix with RTCA/DO-181D.

This Appendix offers a potential change to DO-181D with revisions of text for:

Section §2.1 – General Requirements for All Equipment,

- Replace Section §2.1.7, Flight Crew Control Functions
- Add Section §2.1.10.1, Antenna/Transponder Configurations

Section §2.2 – Minimum Performance Standards – Standard Conditions and Signals,

- Add Section §2.2.26, Mode S Transponder Hijack Mode

Section §2.5.4 – Test Procedures,

- Add Section §2.5.4.40, Procedure #40 Mode S Transponder Hijack Mode (§2.2.26)

Appropriate paragraphs of Section §3 – Installed Equipment Performance.

- Replace Section §3.1.2 – Inadvertent Turn Off
- Add Section §3.1 revisions:

    - Add Paragraph §3.1.4.1. – Normal Equipment Operations,
    - Add Paragraph §3.1.4.2 – Hijack Mode Equipment Operations,
    - Add Paragraph §3.1.8 – Single Operational Transponder at One Time,

    - Add Paragraph §3.3.16 – Single Operational Transponder at One Time, and
    - Add Paragraph §3.3.17 – Hijack Mode Operations

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2.1.7 Flight Crew Control Functions

The following functions **shall** be provided.

a. Means of selecting each of the ATCRBS 4096 Identity Codes and of indicating the code selected.

(1). If the Hijack Mode (§2.2.26) is activated by means that do not involve the Control Function, then the "7500" Hijack Code **shall NOT** be displayed by the Control Function.

Note: *An example of a means that does not involve the Control Function would be an input discrete connected to a switch.*

b. ATCRBS, ATCRBS/Mode S All Call, and Mode S-only All Call Interrogations

(1). Non-Hijack Mode (§2.2.26):

Means of selecting the condition in which the transponder is rendered incapable of generating replies to ATCRBS, ATCRBS/Mode S All Call, and Mode S-only All Call interrogations, but continues to generate Mode S squitter transmissions and continues to reply to discretely addressed Mode-S interrogations when the aircraft is on the ground (§2.2.13.1.2.c, §2.2.23.3.7, §2.2.18.2.7.b and §2.2.18.2.7.c) and **NOT** in the Hijack Mode (§2.2.26). Return to normal operation from this condition **shall** be possible within five seconds. If this condition is enabled automatically when the aircraft is on the ground, a flight crew switch is not necessary. If performed manually, this condition **shall** have no effect on the transmission of extended squitters (§2.2.23.1.2) or on the reporting of on-the-ground state (§2.2.13.1.2.c, §2.2.23.3.7, 2.2.18.2.7.b, and 2.2.18.2.7.c).

Transponders that simulate ATCRBS/MODE S All Call interrogations in self-test/squitter transmission may occasionally open their window of non-acceptance for this purpose coincidental with an actual interrogation, thus generating a reply to the interrogations. Such coincidental acceptance periods may be considered tolerable, but must not exceed one percent of transponder operating time.

(2). Hijack Mode (§2.2.26):

No method **shall** be capable of rendering the transponder incapable of generating replies to ATCRBS and Mode-S Only All-Call interrogations whenever the transponder is in the Hijack Mode (§2.2.26) whether in the airborne or in the on-ground state (§2.2.13.1.2.c, §2.2.23.3.7, §2.2.18.2.7.b and §2.2.18.2.7.c). The transponder **shall** also continue to generate Mode S squitter transmissions and reply to discretely addressed Mode-S interrogations when the aircraft is in the Hijack Mode (§2.2.26).

c. Standby Selection:

(1). Non-Hijack Mode (§2.2.26):

Means of selecting the condition in which all transponder functions, other than transmissions on the reply frequency and associated self-testing, are operational (i.e., the Standby condition) when **NOT** in the Hijack Mode (§2.2.26). Return to normal operation from this condition **shall** be possible within five seconds.

(2). Hijack Mode (§2.2.26):

No method **shall** be capable of placing the transponder into the Standby Mode once the transponder has entered the Hijack Mode (§2.2.26) except as specified in §2.2.26.5.2.

d. Means of initiating the IDENT (SPI) feature.

e. Inhibiting Altitude Reporting:

(1). Non-Hijack Mode (§2.2.26):

Means of inhibiting the transmissions of altitude information, while retaining the ATCRBS framing pulses in ATCRBS Mode C replies and while transmitting all ZERO's in the altitude field of Mode S replies when **NOT** in the Hijack Mode (§2.2.26).

(2). Hijack Mode (§2.2.26):

No method **shall** be capable of placing the transponder in a mode that inhibits the transmission of altitude information when in the Hijack Mode (§2.2.26) and in the airborne state (§2.2.13.1.2.c, §2.2.23.3.7, §2.2.18.2.7.b and §2.2.18.2.7.c) except as specified in §2.2.26.2.1.1.b.

f. If the aircraft uses a flight number for aircraft identification, a means **shall** be provided for the variable aircraft identification to be inserted by the pilot.

2.1.10.1 Antenna / Transponder Configurations

When implementing the Hijack Mode (§2.2.26), a means **shall** be provided to distinguish to the transponder that the installation is primarily configured either as described in §2.1.10.1.a or as described in §2.1.10.1.b.

Note: *Such means may be provided by the use of different transponder part numbers, program pins, installation setup or configuration menus, or other acceptable means.*

a. Dual Antenna Systems and Dual Diversity Transponders

The installation is configured with an independent set of antennas (e.g., top and bottom) for each diversity transponder.

While in the Hijack Mode (§2.2.26), a Dual Antenna System and Dual Diversity Transponder configuration must operate in a manner that insures that only one system is radiating from the aircraft at a given time.

Note: *In order to do so, the Dual Antenna System and Dual Diversity Transponder configuration requires that the transponders operate in accordance with Section §2.2.26.1.1.1, §2.2.26.1.2.1, or §2.2.26.1.3.1.*

b. Single Antenna System and Dual Diversity Transponders

The installation is configured with a single set of antennas (e.g., top and bottom) that is switched between two diversity transponders.

While in the Hijack Mode (§2.2.26) a Single Antenna System and Dual Diversity Transponders configuration **shall** operate in a manner that insures that only one transponder is coupled to the radiating antenna system at a given time.

Note: *In order to do so, the Single Antenna System and Dual Diversity Transponder configuration requires that the transponders operate in accordance with Section §2.2.26.1.1.2, §2.2.26.1.2.2, or §2.2.26.1.3.2.*

c. Other Configurations

(1). Dual Antenna Systems and Dual Non-Diversity Transponders

The installation is configured with an independent bottom antenna for each transponder.

In terms of indicating Antenna / Transponder configuration to the transponder, this configuration **shall** be considered to be the same as the Dual Antenna Systems and Dual Diversity Transponder configuration identified in subparagraph §2.1.10.1.a.

(2). Single Antenna and Dual Non-Diversity Transponders

The installation is configured with a single bottom antenna that is switched between two transponders.

In terms of indicating Antenna / Transponder configuration to the transponder, this configuration **shall** be considered to be the same as the Single Antenna System and Dual Diversity Transponder configuration identified in subparagraph §2.1.10.1.b.

(3). All Other Antenna / Transponder Configurations

In terms of indicating Antenna / Transponder configuration to the transponder, all other configurations that are not consistent with §2.1.10.1.a, §2.1.10.1.b, §2.1.10.1.c.(1), or §2.1.10.1.c.(2) **shall** be considered to be the same as the Single Antenna System and Dual Diversity Transponder configuration identified in subparagraph §2.1.10.1.b.

Note: *The single antenna system and single diversity transponder is included in this configuration type.*

2.2.26 Mode S Transponder Hijack Mode

Note: *The following requirements address the implementation of the Hijack Mode via the Mode-S Transponder upon being commanded to enter the mode via Flight Crew Control functions (§2.1.7) or discrete inputs as identified in the subsequent paragraphs. The following requirements do* ***NOT*** *preclude implementation of the Hijack Mode function within existing transponder system installations using appropriate control components or functions which are fully external to the transponder unit itself.*

2.2.26.1 Hijack Mode Entry Procedures

Note 1: *The term "Active On", introduced in the following subparagraphs, refers to the state where the transponder is not in the Hijack Mode nor the Standby state. Refer to Section §2.1.7.c, which specifies the Standby state and thereby implies the Normal state, which is equivalent to the Active On state.*

Note 2: *The terms "Active Hijack" mode and "Standby Hijack" mode, introduced in the following subparagraphs, refers to two different modes of operation as described below. The term "Hijack Mode" is a generic term and refers to both the Active Hijack Mode and the Standby Hijack Mode of the transponder.*

2.2.26.1.1 Standard "7500" Code Entry

Upon continuous receipt (or selection) of 4096 Identity Code **"7500"** (see §2.1.7.a and §2.2.13.1.2.b) for a minimum period of 10 seconds, transponders **shall** operate depending upon the intended configuration and the initial state of the unit as follows:

Note: *The period of 10 seconds applies to "as seen by the transponder." Any additional latency that is applied by the control function that is providing the "7500" code must be taken into consideration at the installed system level.*

2.2.26.1.1.1 Dual Antenna Systems and Dual Diversity Transponder Configuration

Transponders intended for Dual Antenna Systems and Dual Diversity Transponder configuration (see §2.1.10.1.a) **shall** operate as follows:

a. The Active On transponder **shall** enter the Active Hijack Mode.

b. The Standby transponder **shall** enter the Standby Hijack Mode

2.2.26.1.1.2 Single Antenna System and Dual Diversity Transponder Configuration

Transponders intended for Single Antenna System and Dual Diversity Transponder configurations (see §2.1.10.1.b) **shall** operate as follows:

a. The Active On transponder **shall** enter the Active Hijack Mode.

b. The Standby transponder **shall** enter the Active Hijack Mode.

Note: *For Single Antenna Set – Dual Diversity Transponder Configurations a means should be provided to ensure that the Standby transponder will not cause adverse emission effects on-board the aircraft. This may be implemented by having the transponder "check" if there is an antenna actually connected before transmitting in the Active Hijack Mode or ensuring that the standby transponder antenna ports are properly terminated.*

2.2.26.1.2 "7500" Code Entry with SPI

Upon receipt (or selection) of 4096 Identity Code "7500" (see §2.1.7.a and §2.2.13.1.2.b) and activation of the Special Position Identifier (SPI, Ident.) (see §2.1.7.d and §2.2.13.1.2.d) being coincident in any order, transponders **shall** operate depending upon the intended configuration and the initial state of the unit as follows:

Note: *The requirement is written with any coincidence or order between the "7500" Identity Code and the SPI since some controls immediately send the 4096 Identity Code upon activation of the SPI. Other controls may add latency to the code entry but not the SPI. Still other installations may implement a separate SPI activation such as a remotely activated discrete that is not a direct function of the Control Panel.*

2.2.26.1.2.1 Dual Antenna Systems and Dual Diversity Transponder Configuration

Transponders intended for Dual Antenna Systems and Dual Diversity Transponder configurations (see §2.1.10.1.a) **shall** operate as follows:

a. The Active On transponder **shall** immediately enter the Active Hijack Mode.

b. The Standby transponder **shall** immediately enter the Standby Hijack Mode

2.2.26.1.2.2 Single Antenna System and Dual Diversity Transponder Configuration

Transponders intended for Single Antenna System and Dual Diversity Transponder configurations (see §2.1.10.1.b) **shall** operate as follows:

a. The Active On transponder **shall** immediately enter the Active Hijack Mode.

b. The Standby transponder **shall** immediately enter the Active Hijack Mode.

2.2.26.1.3 Hijack Mode Discrete Initialization.

a. The transponder **shall** provide for a discrete input to allow Hijack mode activation.

b. De-bounce time necessary to verify that the discrete was properly activated **shall NOT** exceed 1.0 seconds.

c. Upon detection of the discrete input, transponders **shall** operate depending upon the intended configuration and the initial state of the unit as follows:

2.2.26.1.3.1 Dual Antenna Systems and Dual Diversity Transponder Configuration

Transponders intended for Dual Antenna Systems and Dual Diversity Transponder configurations (see §2.1.10.1.a) **shall** operate as follows:

a. The Active On transponder **shall** immediately enter the Active Hijack Mode.

b. The Standby transponder **shall** immediately enter the Standby Hijack Mode.

2.2.26.1.3.2 Single Antenna System and Dual Diversity Transponder Configuration

Transponders intended for Single Antenna System and Dual Diversity Transponder configurations (see §2.1.10.1.b) **shall** operate as follows:

a. The Active On transponder **shall** immediately enter the Active Hijack Mode.

b. The Standby transponder **shall** immediately enter the Active Hijack Mode.

2.2.26.2 Active Hijack Mode Operations

Note: *Special consideration for installed equipment configurations are addressed in Section §3.0, "Installed Equipment Performance."*

2.2.26.2.1 General Requirements (Airborne and On-Ground states)

Upon entry of the Active Hijack Mode, both an Airborne unit and an On-Ground unit **shall**:

a. Enter 4096 Identity Code "7500" into all Mode-A ATCRBS (see §2.2.13.1.2.b and §2.2.4.1.2) replies and into the ID (see §2.2.14.4.16) field of DF=5, DF=21 Mode-S replies.

b. Set the SPI (see §2.2.4.1.3) active in all Mode-A ATCRBS replies for a period of 18 ±1 seconds.

c. Accept no further transponder control information.

Note: *The typical Control functions implemented for the transponder include but are not limited to Standby/On selection, Altitude Reporting selection, SPI initiation, 4096 Identity Code selection, Altitude Data Source selection, Transponder "1/2" selection, and Functional Test activation.*

d. Remain in Active Hijack Mode until the Hijack Mode Exit procedure is performed (see subparagraph §2.2.26.5 and specifically §2.2.26.5.2).

e. Establish the Alert Condition in accordance with Section §2.2.18.2.7.

f. Establish the Flight Status, "FS", field in accordance with Section §2.2.14.4.14.

g. Continue to emit squitter transmissions.

2.2.26.2.1.1 Altitude Reporting Requirements

a. Valid Altitude Information Available:

When in the Active Hijack Mode both an Airborne transponder and an On Ground transponder **shall** continually provide the transmission of valid altitude information (see §2.1.7.e.(2)) in all replies to interrogations required by §2.1.7.b and §2.1.7.e regardless of flight crew or other commands that may attempt to inhibit the reporting of altitude data.

b. Invalid Altitude Information:

When in the Active Hijack Mode, invalid altitude information **shall** result in both an Airborne transponder and an On Ground transponder continuing to:

(1). Provide ATCRBS Mode C replies with ATCRBS Framing Pulses only

(2). Provide Mode S replies with all ZERO's in the altitude field

2.2.26.2.1.2 TCAS Communication Requirements (if TCAS equipped)

When in the Active Hijack mode, the transponder **shall** continue to support all TCAS operations as required with the following exceptions:

a. The transponder **shall** set the Sensitivity Level Control sent to the on-board TCAS to a maximum capability of "TA Only" mode. The following constraints **shall** apply:

(1). If the Sensitivity Level Control (SLC) received by the transponder from its associated Control function is set to indicate a mode that is less than the "TA/RA" mode (i.e., SL=1 or 2) then the same SLC **shall** be provided to the on-board TCAS.

(2). If the Sensitivity Level Control received from the Control function is set to TA/RA mode, then it **shall** be changed to TA Only (i.e., SL=2) prior to the transponder providing it to the on-board TCAS.

Note 1: *ARINC-735A, Attachment 6D provides the following definition for Manual Sensitivity Level Control via the ARINC-429 Label "016" TCAS, Mode-S, and TA/RA Display control word.*

Manual Sensitivity Level Control			
BITS			***MEANING***
17	***16***	***15***	
0	*0*	*0*	*SL = 0 (AUTOMATIC)*
0	*0*	*1*	*SL = 1 (STANDBY)*
0	*1*	*0*	*SL = 2 (TA ONLY)*
0	*1*	*1*	*SL = 3*
1	*0*	*0*	*SL = 4*
1	*0*	*1*	*SL = 5*
1	*1*	*0*	*SL = 6*
1	*1*	*1*	*SL = 7*

Note 2: *SL = 0 may not be used by all control functions.*

b. The transponder **shall** set the 4096 Identity Code sent to the on-board TCAS to the code of "7500" at all times while in the Active Hijack Mode.

Note: *This action should be performed, as it may be advantageous in the future to advise the on-board TCAS that the transponder system is set to the Hijack mode.*

2.2.26.2.2 On-Ground State Only

The transponder **shall** continue to operate in accordance with §2.1.7.b when in the Active Hijack Mode and in the On-Ground state (§2.2.13.1.2.c, §2.2.23.3.7, §2.2.18.2.7.b and §2.2.18.2.7.c).

2.2.26.2.3 Loss of Control

Once in the Active Hijack Mode, the transponder **shall** ensure that it remains in the Active Hijack mode even if all communication is lost with the Control function. Specifically, the transponder **shall NOT** enter the Active On, Standby or Standby Hijack modes upon determining that it is no longer receiving control information.

Note: *TCAS System installations require that the transponder pass control information to the TCAS Computer "AS RECEIVED." Loss of control information to the transponder will result in loss of control information to the TCAS Computer, which in turn may result in a "TCAS System Fail" indication to the operator.*

2.2.26.3 Standby Hijack Mode Operations

2.2.26.3.1 General Requirements (Airborne and On-Ground states)

Upon entry of the Standby Hijack Mode, both an Airborne unit and a unit on the Ground **shall**:

a. Accept no further transponder control information.

Note: *The typical Control functions implemented for the transponder include but are not limited to Standby/On selection, Altitude Reporting selection, SPI initiation, 4096 Identity Code selection, Altitude Data Source selection, Transponder "1/2" selection, and Functional Test activation.*

b. **NOT** reply to ATCRBS interrogations.

c. **NOT** reply to Mode S interrogations.

d. **NOT** emit squitter transmissions.

e. Remain in Standby Hijack Mode until the Hijack Mode Exit procedure is performed (see subparagraph §2.2.26.5 and specifically §2.2.26.5.2). Specifically, the transponder **shall NOT** be capable of exiting the Standby Hijack Mode and entering the Active Hijack or the Active ON Mode.

2.2.26.3.2 TCAS Communication Requirements (if TCAS equipped)

When in the Standby Hijack mode, the transponder **shall** continue to support all TCAS operations as required with the following exceptions:

a. The transponder **shall** set the Sensitivity Level Control sent to the on-board TCAS to a maximum capability of TA Only mode. The following constraints **shall** apply:

(1). If the Sensitivity Level Control (SLC) received by the transponder from its associated Control function is set to indicate a mode that is less than

the TA/RA mode (i.e., SL=1 or 2) then the same SLC **shall** be provided to the on-board TCAS.

(2). If the Sensitivity Level Control received from the Control function is set to TA/RA mode, then it **shall** be changed to TA Only (i.e., SL=2) prior to the transponder providing it to the on-board TCAS.

Note 1: *ARINC-735A, Attachment 6D provides the following definition for Manual Sensitivity Level Control via the ARINC-429 Label "016" TCAS, Mode-S, and TA/RA Display control word.*

Manual Sensitivity Level Control			
BITS			***MEANING***
17	***16***	***15***	
0	*0*	*0*	*SL = 0 (AUTOMATIC)*
0	*0*	*1*	*SL = 1 (STANDBY)*
0	*1*	*0*	*SL = 2 (TA ONLY)*
0	*1*	*1*	*SL = 3*
1	*0*	*0*	*SL = 4*
1	*0*	*1*	*SL = 5*
1	*1*	*0*	*SL = 6*
1	*1*	*1*	*SL = 7*

Note 2: *SL = 0 may not be used by all control functions.*

b. The transponder **shall** set the 4096 Identity Code sent to the on-board TCAS to the code of "7500" at all times while in the Standby Hijack Mode.

Note: *This action should be performed, as it may be advantageous in the future to advise the on-board TCAS that the transponder system is set to the Hijack mode.*

2.2.26.3.3 Loss of Control

Once in the Standby Hijack Mode, the transponder **shall** ensure that it remains in the Standby Hijack mode even if all communication is lost with the Control function. Specifically, the transponder **shall NOT** enter the Standby, Active On, or Active Hijack modes upon determining that it is no longer receiving control information.

Note: *TCAS System installations require that the transponder pass control information to the TCAS Computer "AS RECEIVED." Loss of control information to the transponder will result in loss of control information to the TCAS Computer, which in turn may result in a "TCAS System Fail" indication to the operator.*

2.2.26.4 Hijack Mode Indication

a. A means **shall** be provided to indicate that the transponder is in the Active Hijack Mode.

b. A means **shall** be provided to indicate that the transponder is in the Standby Hijack Mode for transponders intended for installation in the Dual Antenna Systems and Dual Diversity Transponder configuration.

Note: *The Standby Hijack Mode indication is required to give some indication that the transponder is in that mode. Otherwise, it would be impossible to verify that the transponder exits the mode upon proper execution of the exit procedures.*

c. Momentary power interrupts **shall NOT** cause the indication described in subparagraph §2.2.26.4.a. to give a false indication that the Active Hijack Mode is active.

d. Momentary power interrupts **shall NOT** cause the indication described in subparagraph §2.2.26.4.b. to give a false indication that the Standby Hijack Mode is active.

Note: *The Hijack Mode Indication is specifically not intended for flight deck implementation. Some installations may not desire an indication of the Hijack Mode: however, the transponder must be capable of providing such capability if other installations or regulatory agencies should require such indication.*

2.2.26.5 Hijack Mode Exit Procedures

Note: *Refer to §2.2.13.1.2.c, §2.2.23.3.7, §2.2.18.2.7.b, and §2.2.18.2.7.c for determination of Airborne or On-Ground (i.e., Surface) state.*

2.2.26.5.1 Airborne State

Performance of Hijack Mode Exit Procedures (§2.2.26.5) while in the airborne state **shall** result in the transponder **NOT** exiting the Active Hijack Mode nor the Standby Hijack Mode.

2.2.26.5.2 On-Ground State

While in the On-Ground State, a means **shall** be provided that **shall** result in:

a. The Active Hijack Mode transponder exiting the Active Hijack mode.

b. The Standby Hijack transponder exiting the Standby Hijack Mode.

c. The following indications that the Hijack Mode Exit operation has successfully been accomplished.

(1). Provide a satisfactory visual indication (e.g., illuminating the Functional Test Lamp) for a minimum period of 1 second.

(2). Ensuring that the Active Hijack Mode Indication (§2.2.26.4.a) indicates that the Active Hijack Mode is **NOT** active.

(3). Ensuring that the Standby Hijack Mode Indication (§2.2.26.4.b) indicates that the Standby Hijack Mode is **NOT** active.

2.2.26.6 Power Interrupt Conditions

If the Hijack Mode Exit procedure has not been performed as per §2.2.26.5.2, transponders that have the capability to retain last known state information prior to a Power Off condition (e.g., Non-Volatile Memory, etc.) **shall** provide the capability for the transponder to return to the Active Hijack Mode or Standby Hijack Mode upon restoration of power.

2.5.4.40 Procedure #40 Mode S Transponder Hijack Mode (§2.2.26)

Part 1 of this procedure verifies that the transponder intended for a Dual Antenna System and Dual Diversity Transponder Configuration properly executes all the Hijack Mode Entry requirements specified in §2.2.26 for the Mode S Transponder Hijack Mode.

Part 2 of this procedure verifies that the transponder intended for a Single Antenna System and Dual Diversity Transponder Configuration properly executes all the Hijack Mode Entry requirements specified in §2.2.26 for the Mode S Transponder Hijack Mode.

Parts 3 and 4 of this procedure tests the functions of the Hijack Modes and contains the actual tests which are common to both types of installation configuration. These tests are called out specifically in Parts 1 and 2 as needed.

Part 5 of this procedure tests the power interrupt operations of the Hijack Modes.

Note: *This entire procedure assumes that the transponder is configured such that the Air/Ground discrete inputs are being used to inhibit replies in accordance with §2.1.7.b.*

Part 1: Dual Antenna System and Dual Diversity Transponder Configuration

Note: *This procedure applies to the transponder in a Dual Antenna Systems and Dual Diversity Transponder configuration.*

a. Initial State = Active On

With the transponder being in the Active On and Airborne states and **NOT** in the Hijack Mode:

(1). Normal Non-Hijack Operation (initial test state)

Provide the transponder with a 4096 Identity Code of "7777" and a Sensitivity Level Control (SLC) of "0" decimal, and **NO** SPI. Provide the transponder with an altitude input of 8,000 feet. Ensure that the altitude reporting function of the transponder is **NOT** inhibited.

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7777" and **NO** SPI Pulse.

(b). Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 8,000 feet.

(c). Replies to all Mode S All-Call and Mode S-only All-Call interrogations with an appropriate DF=11 Mode S reply.

(d). Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 8,000 feet.

(e). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7777."

(f). Properly provides the on-board TCAS (if TCAS equipped) with an SLC=0 decimal via the Transponder/TCAS interface

(g). Properly provides the on-board TCAS (if TCAS equipped) with a 4096 Identity Code set to "7777."

(h). Is **NOT** indicating the Hijack mode.

(2). Standard "7500" Code Entry (§2.2.26.1.1, §2.2.26.1.1.1.a)

With the transponder in the Active On and Airborne states, provide the transponder with a 4096 Identity Code of "7500" and a Sensitivity Level Control (SLC) of "0" decimal, and **NO** SPI. Provide the transponder with an altitude input of 8,000 feet.

(a). Approximately 10 seconds after providing the 4096 Identity Code of "7500", verify the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing all the Airborne tests as called out in Part 3.a.

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b. (5).

(c). Provide the transponder with a 4096 Identity Code of "7500."

Approximately 10 seconds after providing the 4096 Identity Code of "7500", verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing all the On-Ground tests as called out in Part 3.b.

(3). "7500" Code Entry with SPI (§2.2.26.1.2, §2.2.26.1.2.1.a)

With the transponder in the Active On and Airborne states, provide the transponder with a 4096 Identity Code of "7500" and a Sensitivity Level Control (SLC) of "0" decimal. Provide the transponder with an altitude input of 8,000 feet. As soon as possible, thereafter, initiate the SPI (Ident) function.

(a). Immediately after providing the SPI function, verify the transponder has entered the Active Hijack mode by proceeding

to Part 3 of these test procedures and performing the Airborne General Requirements tests as called out in Part 3.a.(1).

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b.(5).

(c). Provide the transponder with a 4096 Identity Code of "7500." As soon as possible, thereafter, initiate the SPI (Ident) function.

Immediately after providing the SPI function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the On-Ground General Requirements tests as called out in Part 3.b.(1).

(d). Exit the Hijack Mode as called out in Part 3.b.(5) of these test procedures.

(4). Hijack Mode Discrete Initialization (§2.2.26.1.3, §2.2.26.1.3.1.a)

With the transponder in the Active On and Airborne states, provide the transponder with a 4096 Identity Code of "7777" and a Sensitivity Level Control (SLC) of "0" decimal. Provide the transponder with an altitude input of 8,000 feet. Activate the Hijack Mode Discrete function for approximately one second, then deactivate the Hijack Mode Discrete function.

(a). Immediately after activating the Hijack Mode Discrete function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the Airborne General Requirements tests as called out in Part 3.a.(1).

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b.(5).

(c). Activate the Hijack Mode Discrete function for approximately one second, then deactivate the Hijack Mode Discrete function.

Immediately after activating the Hijack Mode Discrete function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the On-Ground General Requirements tests as called out in Part 3.b.(1).

(d). Exit the Hijack Mode as called out in Part 3.b.(5) of these test procedures.

b. Initial State = Standby

With the transponder being in the Standby and Airborne states and **NOT** in the Hijack Mode:

(1). Normal Non-Hijack Operation (initial test state)

Provide the transponder with a 4096 Identity Code of "7777" and a Sensitivity Level Control (SLC) of "1" decimal, and **NO** SPI. Provide the transponder with an altitude input of 8,000 feet.

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Does **NOT** reply to any of the interrogations.

(b). Does **NOT** emit squitter transmissions.

(c). Does **NOT** indicate that it **IS** in the Standby Hijack Mode.

(2). Standard "7500" Code Entry (§2.2.26.1.1, §2.2.26.1.1.1.b)

With the transponder in the Standby and Airborne states, provide the transponder with a 4096 Identity Code of "7500" and a Sensitivity Level Control (SLC) of "1" decimal, and **NO** SPI. Provide the transponder with an altitude input of 8,000 feet.

(a). Approximately 10 seconds after providing the 4096 Identity Code of "7500", verify that the transponder has entered the Standby Hijack mode by proceeding to Part 4 of these test procedures and performing all the Airborne tests as called out in Part 4.a.

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 4 of these test procedures and exit the Hijack Mode as called out in Part 4.b.(4).

(c). Provide the transponder with a 4096 Identity Code of "7500."

Approximately 10 seconds after providing the 4096 Identity Code of "7500," verify that the transponder has entered the Standby Hijack mode by proceeding to Part 4 of these test procedures and performing all the On-Ground tests as called out in Part 4.b.

(3). "7500" Code Entry with SPI (§2.2.26.1.2, §2.2.26.1.2.1.b)

With the transponder in the Standby and Airborne states, provide the transponder with a 4096 Identity Code of "7500" and a Sensitivity Level Control (SLC) of "1" decimal. Provide the transponder with an altitude input of 8,000 feet. As soon as possible, thereafter, initiate the SPI (Ident) function.

(a). Immediately after providing the SPI function, verify that the transponder has entered the Standby Hijack mode by proceeding

to Part 4 of these test procedures and performing the Airborne General Requirements tests as called out in Part 4.a.(1).

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 4 of these test procedures and exit the Hijack Mode as called out in Part 4.b.(4).

(c). Provide the transponder with a 4096 Identity Code of "7500." As soon as possible, thereafter, initiate the SPI (Ident) function.

Immediately after providing the SPI function, verify that the transponder has entered the Standby Hijack mode by proceeding to Part 4 of these test procedures and performing the On-Ground General Requirements tests as called out in Part 4.b.(1).

(d). Exit the Hijack Mode as called out in Part 4.b.(4) of these test procedures.

(4). Hijack Mode Discrete Initialization (§2.2.26.1.3, §2.2.26.1.3.1.b)

With the transponder in the Standby and Airborne states, provide the transponder with a 4096 Identity Code of "7777" and a Sensitivity Level Control (SLC) of "1" decimal. Provide the transponder with an altitude input of 8,000 feet. Activate the Hijack Mode Discrete function for approximately one second, then deactivate the Hijack Mode Discrete function.

(a). Immediately after activating the Hijack Mode Discrete function, verify that the transponder has entered the Standby Hijack mode by proceeding to Part 4 of these test procedures and performing the Airborne General Requirements tests as called out in Part 4.a.(1).

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 4 of these test procedures and exit the Hijack Mode as called out in Part 4.b.(4).

(c). Activate the Hijack Mode Discrete function for approximately one second, then deactivate the Hijack Mode Discrete function.

Immediately after activating the Hijack Mode Discrete function, verify that the transponder has entered the Standby Hijack mode by proceeding to Part 4 of these test procedures and performing the On-Ground General Requirements tests as called out in Part 4.b.(1).

(d). Exit the Hijack Mode as called out in Part 4.b.(4) of these test procedures.

Part 2: Single Antenna System and Dual Diversity Transponder Configuration

Note: *This procedure applies to the transponder in a Single Antenna System and Dual Diversity Transponder configuration.*

a. Initial State = Active On

With the transponder being in the Active On and Airborne states and **NOT** in the Hijack Mode:

(1). Normal Non-Hijack Operation (initial test state)

Provide the transponder with a 4096 Identity Code of "7777" and a Sensitivity Level Control (SLC) of "0" decimal, and **NO** SPI. Provide the transponder with an altitude input of 8,000 feet. Ensure that the altitude reporting function of the transponder is **NOT** inhibited.

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7777" and **NO** SPI Pulse.

(b). Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 8,000 feet.

(c). Replies to all Mode S All-Call and Mode S-only All-Call interrogations with an appropriate DF=11 Mode S reply.

(d). Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 8,000 feet.

(e). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7777."

(f). Properly provides the on-board TCAS (if TCAS equipped) with an SLC=0 decimal via the Transponder/TCAS interface

(g). Properly provides the on-board TCAS (if TCAS equipped) with a 4096 Identity Code set to "7777."

(h). Is **NOT** indicating the Hijack mode.

(2). Standard "7500" Code Entry (§2.2.26.1.1, §2.2.26.1.1.2.a)

With the transponder in the Active On and Airborne states, provide the transponder with a 4096 Identity Code of "7500" and a Sensitivity Level Control (SLC) of "0" decimal, and **NO** SPI. Provide the transponder with an altitude input of 8,000 feet.

(a). Approximately 10 seconds after providing the 4096 Identity Code of "7500", verify the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing all the Airborne tests as called out in Part 3.a.

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b.(5).

(c). Provide the transponder with a 4096 Identity Code of "7500."

Approximately 10 seconds after providing the 4096 Identity Code of "7500", verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing all the On-Ground tests as called out in Part 3.b.

(3). "7500" Code Entry with SPI (§2.2.26.1.2, §2.2.26.1.2.2.a)

With the transponder in the Active On and Airborne states, provide the transponder with a 4096 Identity Code of "7500" and a Sensitivity Level Control (SLC) of "0" decimal. Provide the transponder with an altitude input of 8,000 feet. As soon as possible, thereafter, initiate the SPI (Ident) function.

(a). Immediately after providing the SPI function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the Airborne General Requirements tests as called out in Part 3.a.(1).

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b.(5).

(c). Provide the transponder with a 4096 Identity Code of "7500." As soon as possible, thereafter, initiate the SPI (Ident) function.

Immediately after providing the SPI function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the On-Ground General Requirements tests as called out in Part 3.b.(1).

(d). Exit the Hijack Mode as called out in Part 3.b.(5) of these test procedures.

(4). Hijack Mode Discrete Initialization (§2.2.26.1.3, §2.2.26.1.3.2.a)

With the transponder in the Active On and Airborne states, provide the transponder with a 4096 Identity Code of "7777" and a Sensitivity Level Control (SLC) of "0" decimal. Provide the transponder with an altitude input of 8,000 feet. Activate the Hijack Mode Discrete function for approximately one second, then deactivate the Hijack Mode Discrete function.

(a). Immediately after activating the Hijack Mode Discrete function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing

the Airborne General Requirements tests as called out in Part 3.a.(1).

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b.(5).

(c). Activate the Hijack Mode Discrete function for approximately one second, then deactivate the Hijack Mode Discrete function.

Immediately after activating the Hijack Mode Discrete function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the On-Ground General Requirements tests as called out in Part 3.b.(1).

(d). Exit the Hijack Mode as called out in Part 3.b.(5) of these test procedures.

b. Initial State = Standby

With the transponder being in the Standby and Airborne states and **NOT** in the Hijack Mode:

(1). Normal Non-Hijack Operation (initial test state)

Provide the transponder with a 4096 Identity Code of "7777" and a Sensitivity Level Control (SLC) of "0" decimal, and **NO** SPI. Provide the transponder with an altitude input of 8,000 feet.

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Does **NOT** reply to any of the interrogations.

(b). Does **NOT** emit squitter transmissions.

(c). Does **NOT** indicate that it **IS** in the Active Hijack Mode.

(2). Standard "7500" Code Entry (§2.2.26.1.1, §2.2.26.1.1.2.b)

With the transponder in the Standby and Airborne states, provide the transponder with a 4096 Identity Code of "7500" and a Sensitivity Level Control (SLC) of "0" decimal, and **NO** SPI. Provide the transponder with an altitude input of 8,000 feet.

(a). Approximately 10 seconds after providing the 4096 Identity Code of "7500," verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing all the Airborne tests as called out in Part 3.a.

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b.(5).

(c). Set the transponder to the Standby state and provide the transponder with a 4096 Identity Code of "7500."

Approximately 10 seconds after providing the 4096 Identity Code of "7500", verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing all the On-Ground tests as called out in Part 3.b.

(3). "7500" Code Entry with SPI (§2.2.26.1.2, §2.2.26.1.2.2.b)

With the transponder in the Standby and Airborne states, provide the transponder with a 4096 Identity Code of "7500" and a Sensitivity Level Control (SLC) of "0" decimal. Provide the transponder with an altitude input of 8,000 feet. As soon as possible, thereafter, initiate the SPI (Ident) function.

(a). Immediately after providing the SPI function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the Airborne General Requirements tests as called out in Part 3.a.(1).

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b.(5).

(c). Set the transponder to the Standby state and provide the transponder with a 4096 Identity Code of "7500." As soon as possible, thereafter, initiate the SPI (Ident) function.

Immediately after providing the SPI function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the On-Ground General Requirements tests as called out in Part 3.b.(1).

(d). Exit the Hijack Mode as called out in Part 3.b.(5) of these test procedures.

(4). Hijack Mode Discrete Initialization (§2.2.26.1.3, §2.2.26.1.3.2.b)

With the transponder in the Standby and Airborne states, provide the transponder with a 4096 Identity Code of "7777" and a Sensitivity Level Control (SLC) of "0" decimal. Provide the transponder with an altitude input of 8,000 feet. Activate the Hijack Mode Discrete function for approximately one second, then deactivate the Hijack Mode Discrete function.

(a). Immediately after activating the Hijack Mode Discrete function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the Airborne General Requirements tests as called out in Part 3.a.(1).

(b). Provide the transponder with an altitude input of 500 feet and set the transponder to the On-Ground state.

Proceed to Part 3 of these test procedures and exit the Hijack Mode as called out in Part 3.b.(5).

(c). Set the transponder to the Standby state. Activate the Hijack Mode Discrete function for approximately one second, then deactivate the Hijack Mode Discrete function.

Immediately after activating the Hijack Mode Discrete function, verify that the transponder has entered the Active Hijack mode by proceeding to Part 3 of these test procedures and performing the On-Ground General Requirements tests as called out in Part 3.b.(1).

(d). Exit the Hijack Mode as called out in Part 3.b.(5) of these test procedures.

Part 3: Active Hijack Mode Operation (§2.2.26.2)

Note: *This procedure applies to the **Active On** transponder in a Dual Antenna Systems and Dual Diversity Transponder configuration and to both transponders in a Single Antenna System and Dual Diversity Transponder configuration.*

a. Airborne Testing

With the transponder being in the Active Hijack mode and the Airborne state, provide the transponder with a Sensitivity Level Control (SLC) of "0" decimal and an altitude input of 8,000 feet.

(1). General Requirements Tests (§2.2.26.2.1.a, b, §2.2.26.4.a)

Immediately after the transponder enters Active Hijack mode, interrogate the transponder with ATCRBS Mode-A, Mode S All-Call, Mode S-only All-Call, Mode S UF=5, and UF=21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500."

(b). Replies to all ATCRBS Mode-A interrogations with the SPI Pulse set for a period of 18 ±1 seconds.

(c). Replies to all Mode S All-Call and Mode S-only All-Call interrogations with an appropriate DF=11 Mode S reply.

(d). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

(e). Continues to emit squitter transmissions.

(f). Properly indicates that it **IS** in the Active Hijack Mode.

(g). Properly indicates the Alert Status in the "FS" field in accordance with Sections §2.2.14.4.14 and §2.2.18.2.7.

(2). Altitude Reporting Requirements Tests (§2.2.26.2.1.1)

(a). Interrogate the transponder with ATCRBS Mode-C, Mode S UF=4 and UF=20 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 8,000 feet.

[2]. Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 8,000 feet.

(b). Attempt to inhibit the Altitude Reporting function of the transponder. Interrogate the transponder with ATCRBS Mode-C, Mode S UF=4 and UF=20 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 8,000 feet.

[2]. Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 8,000 feet.

(c). Provide the transponder with an INVALID altitude input of 10,000 feet. Interrogate the transponder with ATCRBS Mode-C, Mode S UF=4 and UF=20 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-C interrogations with framing pulses only.

[2]. Replies to all UF 4, UF=20 Mode-S interrogations with an Altitude Field (AC) of all ZERO's.

(d). Restore the Valid altitude input of 8,000 feet.

(3). TCAS Communication Requirements Tests (§2.2.26.2.1.2)

(a). Provide the transponder with a Sensitivity Level Control (SLC) of "1" decimal.

Verify that the transponder (if TCAS equipped):

[1]. Properly provides the on-board TCAS with an SLC=1 decimal via the Transponder/TCAS interface

[2]. Properly provides the on-board TCAS with a 4096 Identity Code set to "7500."

(b). Provide the transponder with a Sensitivity Level Control (SLC) of "2" decimal.

Verify that the transponder (if TCAS equipped) properly provides the on-board TCAS with an SLC=2 decimal via the Transponder/TCAS interface.

(c). Provide the transponder with a Sensitivity Level Control (SLC) of "0" decimal.

Verify that the transponder (if TCAS equipped) properly provides the on-board TCAS with an SLC=2 decimal via the Transponder/TCAS interface.

(4). Loss of Control and Attempted Control Changes Tests (§2.2.26.2.1.c, and §2.2.26.2.3)

(a). Disable the capability to provide the transponder with a 4096 Identity Code of "7500", a Sensitivity Level Control (SLC) and other control functions. Ensure that the altitude reporting function of the transponder **IS** inhibited. (Note that if the Altitude Reporting function is selected via the control function, it should be inhibited automatically by removal of the control function capability).

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 8,000 feet.

[3]. Replies to all Mode S All-Call and Mode S-only All-Call interrogations with an appropriate DF=11 Mode S reply.

[4]. Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 8,000 feet.

[5]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[6]. Continues to emit squitter transmissions.

[7]. Does **NOT** provide TCAS with SLC, 4096 Identity Code or any other Control information since the Control Function has been lost.

Note: *The loss of control information to the TCAS Computer may result in a TCAS System fail if the test configuration is integrated with TCAS.*

[8]. Properly indicates that it **IS** in the Active Hijack Mode.

(b). Restore the control function capability to the transponder and set the control function to a setting that attempts to place the transponder into the Standby state. Interrogate the transponder with ATCRBS Mode-A, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[3]. Properly indicates that it **IS** in the Active Hijack Mode.

(c). Provide the transponder with a 4096 Identity Code of "1200." Interrogate the transponder with ATCRBS Mode-A, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[3]. Properly indicates that it **IS** in the Active Hijack Mode.

(d). Provide the transponder with a valid altitude of 10,000 feet on the Alternate Air Data Source. Command the transponder to use the Alternate Air Data Source. Interrogate the transponder with ATCRBS Mode-C, Mode S UF=4 and 20 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 8,000 feet.

[2]. Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 8,000 feet.

[3]. Properly indicates that it **IS** in the Active Hijack Mode.

(e). Command the transponder to Functional Test mode. Interrogate the transponder with ATCRBS Mode-A, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[3]. Properly indicates that it **IS** in the Active Hijack Mode.

(f). Activate the SPI command to the transponder. Interrogate the transponder with ATCRBS Mode-A, Mode S UF=4, 5, 20 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[3]. Indicates that the SPI is **NOT** active in the FS field of DF=4, 5, 20 and 21 replies.

[4]. Properly indicates that it **IS** in the Active Hijack Mode.

(5). Attempted Hijack Mode Exit Verification (§2.2.26.5.1)

Activate the means to exit the Hijack Mode.

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

(b). Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 8,000 feet.

(c). Replies to all Mode S All-Call and Mode S-only All-Call interrogations with an appropriate DF=11 Mode S reply.

(d). Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 8,000 feet.

(e). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

(f). Continues to emit squitter transmissions.

(g). Properly provides the on-board TCAS (if TCAS equipped) with an SLC=2 decimal via the Transponder/TCAS interface.

(h). Properly provides the on-board TCAS (if TCAS equipped) with a 4096 Identity Code set to "7500."

(i). Properly indicates that it **IS** in the Active Hijack Mode.

b. On-Ground Testing

With the transponder being in the Active Hijack mode and the On-Ground state, provide the transponder with a Sensitivity Level Control (SLC) of "0" decimal and an altitude input of 500 feet.

(1). General Requirements Tests (§2.2.26.2.1.a, b, §2.2.26.2.2)

Immediately after the transponder enters Active Hijack mode, interrogate the transponder with ATCRBS Mode-A, Mode S All-Call, Mode S-only All-Call, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

(b). Replies to all Mode S All-Call and Mode S-only All-Call interrogations with an appropriate DF=11 Mode S reply.

(c). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

(d). Continues to emit squitter transmissions.

(e). Properly indicates that it **IS** in the Active Hijack Mode.

(f). Properly indicates the Alert Status in the "FS" field in accordance with Sections §2.2.14.4.14 and §2.2.18.2.7.

(2). Altitude Reporting Requirements Tests (§2.2.26.2.1.1)

(a). Interrogate the transponder with ATCRBS Mode-C, Mode S UF=4 and 20 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 500 feet.

[2]. Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 500 feet.

(b). Attempt to inhibit the Altitude Reporting function of the transponder. Interrogate the transponder with ATCRBS Mode-C, Mode S UF=4 and 20 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 500 feet.

[2]. Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 500 feet.

(c). Provide the transponder with an INVALID altitude input of 1,000 feet. Interrogate the transponder with ATCRBS Mode-C, Mode S UF=4 and 20 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-C interrogations framing pulses only.

[2]. Replies to all UF=4, UF=20 Mode-S interrogations with an Altitude Field (AC) set to all ZERO's.

(d). Restore the Valid altitude input of 500 feet.

(3). TCAS Communication Requirements Tests (§2.2.26.2.1.2)

(a). Provide the transponder with a Sensitivity Level Control (SLC) of "1" decimal.

Verify that the transponder (if TCAS equipped):

[1]. Properly provides the on-board TCAS with an SLC=1 decimal via the Transponder/TCAS interface

[2]. Properly provides the on-board TCAS with a 4096 Identity Code set to "7500."

(b). Provide the transponder with a Sensitivity Level Control (SLC) of "2" decimal.

Verify that the transponder (if TCAS equipped) properly provides the on-board TCAS with an SLC=2 decimal via the Transponder/TCAS interface.

(c). Provide the transponder with a Sensitivity Level Control (SLC) of "0" decimal.

Verify that the transponder (if TCAS equipped) properly provides the on-board TCAS with an SLC=2 decimal via the Transponder/TCAS interface

(4). Loss of Control and Attempted Control Changes Tests (§2.2.26.2.1.c, and §2.2.26.2.3)

(a). Disable the capability to provide the transponder with a 4096 Identity Code of "7500," a Sensitivity Level Control (SLC) and other control functions. Ensure that the altitude reporting function of the transponder IS inhibited. (Note that if the Altitude Reporting function is selected via the control function, it should be

inhibited automatically by removal of the control function capability).

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 500 feet.

[3]. Replies to all Mode S All-Call and Mode S-only All-Call interrogations with an appropriate DF=11 Mode S reply.

[4]. Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 500 feet.

[5]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[6]. Continues to emit squitter transmissions.

[7]. Does **NOT** provide TCAS with SLC, 4096 Identity Code or any other Control information since the Control Function has been lost.

Note: *The loss of control information to the TCAS Computer may result in a TCAS System fail if the test configuration is integrated with TCAS.*

[8]. Properly indicates that it **IS** in the Active Hijack Mode.

(b). Restore the control function capability to the transponder and set the control function to a setting that attempts to place the transponder into the Standby state. Interrogate the transponder with ATCRBS Mode-A, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[3]. Properly indicates that it **IS** in the Active Hijack Mode.

(c). Provide the transponder with a 4096 Identity Code of "1200." Interrogate the transponder with ATCRBS Mode-A, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[3]. Properly indicates that it **IS** in the Active Hijack Mode.

(d). Provide the transponder with a valid altitude of 1,000 feet on the Alternate Air Data Source. Command the transponder to use the Alternate Air Data Source. Interrogate the transponder with ATCRBS Mode-C, Mode S UF=4 and 20 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 500 feet.

[2]. Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 500 feet.

[3]. Properly indicates that it **IS** in the Active Hijack Mode.

(e). Command the transponder to Functional Test mode. Interrogate the transponder with ATCRBS Mode-A, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[3]. Properly indicates that it **IS** in the Active Hijack Mode.

(f). Activate the SPI command to the transponder. Interrogate the transponder with ATCRBS Mode-A, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500" and **NO** SPI pulse.

[2]. Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

[3]. Indicates that the SPI is **NOT** active in the FS field of DF=4, 5, 20 and 21 replies.

[4]. Properly indicates that it **IS** in the Active Hijack Mode.

(5). Hijack Mode Exit Verification (§2.2.26.5.2)

Provide the transponder with a 4096 Identity Code of "7777." Set the control function to an Active On setting. Activate the means to exit the Hijack Mode.

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Does **NOT** reply to ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, or Mode S-only All-Call interrogations.

(b). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7777."

(c). Indicates that the Hijack Mode Exit has been accomplished successfully.

(d). Properly indicates that it **IS NOT** in the Active Hijack Mode.

Part 4: Standby Hijack Mode Operation (§2.2.26.3)

Note: *This procedure applies to the **Standby** transponder in a Dual Antenna Systems and Dual Diversity Transponder configuration.*

a. Airborne Testing (§2.2.26.3.1)

With the transponder being in the Standby Hijack mode and Airborne states, provide the transponder with a Sensitivity Level Control (SLC) of "1" decimal, and an altitude input of 8,000 feet.

(1). General Requirements Tests (§2.2.26.3.1.b, c, d, §2.2.26.4.b)

Immediately after the transponder enters Standby Hijack mode, interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Does **NOT** reply to any of the interrogations.

(b). Does **NOT** emit squitter transmissions.

(c). Properly indicates that it **IS** in the Standby Hijack Mode.

(2). TCAS Communication Requirements Tests (§2.2.26.3.2)

(a). Provide the transponder with a Sensitivity Level Control (SLC) of "1" decimal.

Verify that the transponder (if TCAS equipped):

[1]. Properly provides the on-board TCAS with an SLC = 1 decimal via the Transponder/TCAS interface

[2]. Properly provides the on-board TCAS with a 4096 Identity Code set to "7500."

(b). Provide the transponder with a Sensitivity Level Control (SLC) of "2" decimal.

Verify that the transponder (if TCAS equipped) properly provides the on-board TCAS with an SLC = 2 decimal via the Transponder/TCAS interface

(c). Provide the transponder with a Sensitivity Level Control (SLC) of "0" decimal.

Verify that the transponder (if TCAS equipped) properly provides the on-board TCAS with an SLC=2 decimal via the Transponder/TCAS interface

(3). Loss of Control and Attempted Control Changes Tests (§2.2.26.3.1.a, and §2.2.26.3.3)

(a). Disable the capability to provide the transponder with a 4096 Identity Code of "7500", a Sensitivity Level Control (SLC) and other control functions. Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Does **NOT** reply to any of the interrogations.

[2]. Does **NOT** emit squitter transmissions.

[3]. Does **NOT** provide TCAS with SLC, 4096 Identity Code or any other Control information since the Control Function has been lost.

Note: *The loss of control information to the TCAS Computer may result in a TCAS System fail if the test configuration is integrated with TCAS.*

[4]. Properly indicates that it **IS** in the Standby Hijack Mode.

(b). Restore the control function capability to the transponder and set the control function to a setting that attempts to place the transponder into the Active On state. Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Does **NOT** reply to any of the interrogations.

[2]. Does **NOT** emit squitter transmissions.

[3]. Properly indicates that it **IS** in the Standby Hijack Mode.

(c). Command the transponder to Functional Test mode. Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C,

Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Does **NOT** reply to any of the interrogations.

[2]. Does **NOT** emit squitter transmissions.

[3]. Properly indicates that it **IS** in the Standby Hijack Mode.

(4). Attempted Hijack Mode Exit Verification (§2.2.26.5.1)

Activate the means to exit the Standby Hijack Mode.

Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Does **NOT** reply to any of the interrogations.

(b). Does **NOT** emit squitter transmissions.

(c). Properly provides the on-board TCAS (if TCAS equipped) with an SLC = 2 decimal via the Transponder/TCAS interface.

(d). Properly provides the on-board TCAS (if TCAS equipped) with a 4096 Identity Code set to "7500."

(e). Properly indicates that it **IS** in the Standby Hijack Mode.

b. On-Ground Testing

With the transponder being in the Standby Hijack mode and the On-Ground state, provide the transponder with a Sensitivity Level Control (SLC) of "1" decimal and an altitude input of 500 feet.

(1). General Requirements Tests (§2.2.26.3.1.b, c, d, §2.2.26.4.b)

Immediately after the transponder enters Standby Hijack mode, interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

(a). Does **NOT** reply to any of the interrogations.

(b). Does **NOT** emit squitter transmissions.

(c). Properly indicates that it **IS** in the Standby Hijack Mode.

(2). TCAS Communication Requirements Tests (§2.2.26.3.2)

(a). Provide the transponder with a Sensitivity Level Control (SLC) of "1" decimal.

Verify that the transponder (if TCAS equipped):

[1]. Properly provides the on-board TCAS with an SLC=1 decimal via the Transponder/TCAS interface.

[2]. Properly provides the on-board TCAS with a 4096 Identity Code set to "7500."

(b). Provide the transponder with a Sensitivity Level Control (SLC) of "2" decimal.

Verify that the transponder (if TCAS equipped) properly provides the on-board TCAS with an SLC=2 decimal via the Transponder/TCAS interface.

(c). Provide the transponder with a Sensitivity Level Control (SLC) of "0" decimal.

Verify that the transponder (if TCAS equipped) properly provides the on-board TCAS with an SLC=2 decimal via the Transponder/TCAS interface.

(3). Loss of Control and Attempted Control Changes Tests (§2.2.26.3.1.a, and §2.2.26.3.3)

(a). Disable the capability to provide the transponder with a 4096 Identity Code of "7500," a Sensitivity Level Control (SLC) and other control functions. Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Does **NOT** reply to any of the interrogations.

[2]. Does **NOT** emit squitter transmissions.

[3]. Does **NOT** provide TCAS with SLC, 4096 Identity Code or any other Control information since the Control Function has been lost.

Note: *The loss of control information to the TCAS Computer may result in a TCAS System fail if the test configuration is integrated with TCAS.*

[4]. Properly indicates that it **IS** in the Standby Hijack Mode.

(b). Restore the control function capability to the transponder and set the control function to a setting that attempts to place the transponder into the Active On state. Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Does **NOT** reply to any of the interrogations.

[2]. Does **NOT** emit squitter transmissions.

[3]. Properly indicates that it **IS** in the Standby Hijack Mode.

(c). Command the transponder to Functional Test mode. Interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder:

[1]. Does **NOT** reply to any of the interrogations.

[2]. Does **NOT** emit squitter transmissions.

[3]. Properly indicates that it **IS** in the Standby Hijack Mode.

(4). Hijack Mode Exit Verification (§2.2.26.5.2)

Provide the transponder with a 4096 Identity Code of "7777." Activate the means to exit the Hijack Mode.

Verify that the transponder:

(a). Indicates that the Hijack Mode Exit has been accomplished successfully.

(b). Properly indicates that it **IS NOT** in the Standby Hijack Mode.

Part 5: Power Interrupt Operations (§2.2.26.4.c, d, §2.2.26.6)

a. Normal Non-Hijack Operation (§2.2.26.4.c,d)

(1). Active On Mode

Set the transponder to the Active On state and **NOT** in the Hijack Mode.

Interrupt the power to the transponder for a period of approximately 1-2 seconds.

Verify that the transponder:

(a). Does **NOT** give a false indication that the Active Hijack mode is active.

(b). Does **NOT** give a false indication that the Standby Hijack mode is active (for transponders intended for installation in a Dual Antenna Systems and Dual Diversity Transponder configuration).

(2). Standby Mode

Set the transponder to the Standby state and **NOT** in the Hijack Mode.

Interrupt the power to the transponder for a period of approximately 1-2 seconds.

Verify that the transponder:

(a). Does **NOT** give a false indication that the Active Hijack mode is active.

(b). Does **NOT** give a false indication that the Standby Hijack mode is active (for transponders intended for installation in a Dual Antenna Systems and Dual Diversity Transponder configuration).

b. Active Hijack Mode (§2.2.26.6)

Note: *This procedure applies to the* ***Active On*** *transponder in a Dual Antenna Systems and Dual Diversity Transponder configuration and to both transponders in a Single Antenna Systems and Dual Diversity Transponder configuration.*

(1). Hijack Mode Initialization

With the transponder being in the Active On and Airborne states and **NOT** in the Hijack Mode, provide the transponder with a valid altitude input of 8,000 feet and a Sensitivity Level Control (SLC) of "0" decimal. Ensure that the altitude reporting function of the transponder IS inhibited. Then, initiate the Active Hijack mode via either of the methods identified in Part 1 or Part 2 of these test procedures.

After the transponder has entered the Active Hijack mode, interrogate the transponder with ATCRBS Mode-A, ATCRBS Mode-C, Mode S All-Call, Mode S-only All-Call, Mode S UF=4, 5, 20, and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder properly annunciates that it **IS** in the Hijack Mode.

(2). Power Interruption:

Interrupt the power to transponder for a period of approximately 10 seconds. Retain the conditions applied to the transponder in Part 5.b.(1), except set the 4096 Identity Code to "7777." Then, restore power to the transponder.

Verify that the transponder:

(a). Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500."

(b). Replies to all ATCRBS Mode-A interrogations with the SPI Pulse set for a period of 18 ±1 seconds after restoration of power.

(c). Replies to all ATCRBS Mode-C interrogations with an encoded altitude of 8,000 feet.

(d). Replies to all Mode S All-Call and Mode S-only All-Call interrogations with an appropriate DF=11 Mode S reply.

(e). Replies to all UF=4, UF=20 Mode-S interrogations with an altitude of 8,000 feet.

(f). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

(g). Properly provides the on-board TCAS (if TCAS equipped) with an SLC=2 decimal via the Transponder/TCAS interface.

(h). Properly provides the on-board TCAS (if TCAS equipped) with a 4096 Identity Code set to "7500."

(i). Properly annunciates that it **IS** in the Hijack Mode.

(3). On-Ground Hijack Mode Exit

Set the transponder to the On-Ground state and activate the means to exit the Hijack Mode.

Verify that the transponder:

(a). Indicates that the Hijack Mode Exit has been accomplished successfully.

(b). Properly annunciates that it **IS NOT** in the Active Hijack Mode.

c. Standby Hijack Mode (§2.2.26.6)

Note: *This procedure applies to the **Standby** transponder in a Dual Antenna Systems and Dual Diversity Transponders configuration.*

(1). Standby Hijack Mode Initialization

With the transponder being in the Standby and Airborne states and **NOT** in the "Standby Hijack" mode, initiate the Standby Hijack mode via either of the methods identified in Part 1 of these test procedures.

At least 10 seconds after initiating the Hijack Mode, verify that the transponder properly indicates that it **IS** in the Standby Hijack Mode.

(2). Power Interruption:

Interrupt the power to transponder for a period of approximately 10 seconds. Retain the conditions applied to the transponder in Part 5.c.(1), except set the 4096 Identity Code to "7777." Then, restore power to the transponder.

Verify that the transponder:

(a). Properly annunciates that it **IS** in the Standby Hijack Mode.

(3). On-Ground Hijack Mode Exit

Set the transponder to the On-Ground state and activate the means to exit the Hijack Mode.

Verify that the transponder:

(a). Indicates that the Hijack Mode Exit has been accomplished successfully.

(b). Properly annunciates that it **IS NOT** in the Standby Hijack Mode.

3.1.2 Inadvertent Turn Off

Protection **shall** be provided to prevent the inadvertent turn off of the equipment. Where Hijack functions are provided, to ensure continuous electrical power to the transponders, it **shall** be demonstrated that when the Hijack Mode is triggered that unauthorized removal of electrical power to the transponders, via the flight deck circuit breakers, **shall not** affect the continuous operation of the transponder to output the Hijack Code in both Mode A and Mode S replies.

3.1.4 Aircraft Power Source

The voltage and voltage tolerance characteristics of the equipment **shall** be compatible with the aircraft power source of appropriate category as specified in RTCA/DO-160E.

3.1.4.1 Normal Equipment Operations

The aircraft installation **shall** ensure that appropriate voltage and voltage characteristics required by the transponder equipment **shall** be continuously applied to the transponder equipment at all times that the transponder equipment is required to be operational.

Note: *This requirement does not apply in situations where power to the transponder equipment must be interrupted in order to prevent possible fire conditions or other emergency conditions determined by the Flight Crew.*

3.1.4.2 Hijack Mode Equipment Operations

The aircraft installation **shall** apply all reasonable measures to ensure that appropriate voltage and voltage characteristics required by the transponder equipment **shall** be continuously applied to the transponder equipment at all times that the transponder equipment is functioning in the Hijack Mode. This applies to both the Active On and the Standby transponder equipment.

Note: *This requirement does not apply in situations where power to the transponder equipment must be interrupted in order to prevent possible fire conditions or other emergency conditions determined by the Flight Crew.*

3.1.8 Single Operational Transponder at One Time

a. The aircraft installation **shall** ensure that **ONLY ONE** transponder is coupled to the antenna system and capable of delivering interrogation replies or squitter transmissions from the aircraft at **ANY** given time.

b. The aircraft installation **shall** ensure that **NO** transponder is improperly connected to its antenna system or left in an open-circuit transmission state in

which the transponder could emit excessive RF energy into **ANY** aircraft compartment.

3.3.16 Single Operational Transponder at One Time

Verify:

a. That **ONLY ONE** transponder and associated antenna system is capable of delivering interrogation replies or squitter transmissions from the aircraft at **ANY** given time, and

b. That **NO** transponder is capable of radiating RF energy into any compartment of the aircraft due to improper connection to the antenna system or radiation into an open-circuit.

3.3.17 Hijack Mode Operations

Note: *The following requirements apply to the Hijack Mode function only when implemented internal to the Mode-S Transponder unit.*

Perform the following installed test sequence independently for each transponder in the installation.

a. Hijack Mode Initialization, Verification, and Exit – Configuration One

Note: *This procedure applies to the **Active On** transponder in a Dual Antenna Systems and Dual Diversity Transponder configuration and to both transponders in a Single Antenna System and Dual Diversity Transponder configuration.*

(1). Hijack Mode Initialization and Verification – Configuration One

With the transponder being in the Active On and Airborne states and **NOT** in the Hijack Mode, initiate the Hijack Mode via all of the installed methods identified in §2.2.26.1.1, §2.2.26.1.2, or §2.2.26.1.3.

At least ten seconds after initiating the Hijack Mode, interrogate the transponder with ATCRBS Mode-A, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder system:

(a). Replies to all ATCRBS Mode-A interrogations with the 4096 Identity Code of "7500."

(b). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "7500."

(c). Properly indicates that it **IS** in the Hijack Mode.

(2). Hijack Mode Exit– Configuration One

Starting with the conditions as they existed after §3.3.17.a.(1).(c)., provide the transponder with a 4096 Identity Code of "6767," set the transponder to the On-Ground state and activate the means to exit the

Hijack Mode. Interrogate the transponder with ATCRBS Mode-A, Mode S UF=5, UF=21 interrogations for a minimum period of 20 seconds.

Verify that the transponder system:

(a). Replies to all UF=5, UF=21 Mode-S interrogations with an ID field of "6767."

(b). Properly indicates that it **IS NOT** in the Hijack Mode.

b. Standby Hijack Mode Initialization, Verification, and Exit – Configuration Two

Note: *This procedure applies to **Standby** transponders intended for Dual Antenna System and Dual Diversity Transponder configurations.*

(1). Standby Hijack Mode Initialization – Configuration Two

With the transponder being in the Standby and Airborne states and **NOT** in the Standby Hijack Mode, initiate the Hijack Mode via all of the installed methods identified in §2.2.26.1.1, §2.2.26.1.2, or §2.2.26.1.3.

At least ten seconds after initiating the Hijack Mode, verify that the transponder properly indicates that it **IS** in the Standby Hijack Mode.

(2). Standby Hijack Mode Verification – Configuration Two

Attempt to place the transponder into the Active On mode and interrogate the transponder with ATCRBS Mode-A, Mode S UF=5 and 21 interrogations for a minimum period of 20 seconds.

Verify that the transponder system:

(a). Does **NOT** reply to any of the interrogations.

(b). Properly indicates that it **IS** in the Standby Hijack Mode.

(3). Standby Hijack Mode Exit – Configuration Two

Ensure that the 4096 code provided to the transponder is set to a setting other than "7500."

Set the transponder to the Standby and On-Ground states, then Activate the means to exit the Hijack Mode.

Verify that the transponder properly indicates that it **IS NOT** in the Standby Hijack Mode.